

### **The Claims**

1. (Currently Amended) A method ~~for job management in an HPC environment~~ comprising:

determining an unallocated subset from a plurality of ~~HPC~~ high performance computing (HPC) nodes, each of the unallocated HPC nodes comprising an integrated fabric;  
selecting an HPC job from a job queue; and  
executing the selected job using at least a portion of the unallocated subset of nodes.

2. (Original) The method of Claim 1, wherein selecting the HPC job comprises selecting the HPC job from the job queue based on priority, the selected job comprising dimensions not greater than a topology of the unallocated subset.

3. (Original) The method of Claim 2, wherein selecting the HPC job from the job queue based on priority comprises:

sorting the job queue based on job priority;  
selecting a first HPC job from the sorted job queue;  
determining dimensions of the first HPC job with the topology of the unallocated subset; and

in response to the dimensions of the first HPC job being greater than the topology of the unallocated subset, selecting a second HPC job from the sorted job queue.

4. (Original) The method of Claim 2, wherein the dimensions of the first HPC job are based, at least in part, on one or more job parameters and an associated policy.

5. (Currently Amended) The method of Claim 2, further ~~comprising:~~ comprising dynamically allocating a job spare from the unallocated subset based, at least in part, on the dimensions of the HPC job, wherein executing the selected job comprises executing the selected job using the dynamically allocated job spare.

~~using one or more computer systems, dynamically allocating a job spare from the unallocated subset based, at least in part, on the dimensions of the HPC job; and~~

~~wherein executing the selected job comprises executing the selected job using the dynamically allocated job spare.~~

6. (Currently Amended) The method of Claim 1, wherein the plurality of HPC nodes ~~comprising~~ comprise a first plurality and the method further ~~comprising~~ comprises:

determining that dimensions of the selected job are greater than a topology of the first plurality;

selecting one or more HPC nodes from a second plurality, each of the second HPC nodes comprising an integrated fabric; and

adding the selected second HPC nodes to the unallocated subset to satisfy the dimensions of the selected job.

7. (Original) The method of Claim 6, further comprising returning the second HPC nodes to the second plurality.

8. (Original) The method of Claim 1, further comprising;  
determining that a second HPC job that was executing on a second subset in the plurality of HPC nodes has failed;  
adding the second subset to the unallocated subset; and  
adding the failed job to the job queue.

9. (Currently Amended) Software ~~for job management in an HPC environment~~ embodied in one or more tangible computer-readable media and when executed operable to:

determine an unallocated subset from a plurality of ~~HPC~~ high performance computing (HPC) nodes, each of the unallocated HPC nodes comprising an integrated fabric;

select an HPC job from a job queue; and

execute the selected job using at least a portion of the unallocated subset of nodes.

10. (Currently Amended) The software of Claim 9, wherein the software being operable to select the HPC job comprises the software being operable to select the HPC job from the job queue based on priority, the selected job comprising dimensions not greater than a topology of the unallocated subset.

11. (Currently Amended) The software of Claim 10, wherein the software being operable to select the HPC job from the job queue based on priority comprises the software being operable to:

sort the job queue based on job priority;

select a first HPC job from the sorted job queue;

determine dimensions of the first HPC job with the topology of the unallocated subset; and

in response to the dimensions of the first HPC job being greater than the topology of the unallocated subset, select a second HPC job from the sorted job queue.

12. (Original) The software of Claim 10, wherein the dimensions of the first HPC job are based, at least in part, on one or more job parameters and an associated policy.

13. (Currently Amended) The software of Claim 10, further ~~operable to:~~  
dynamically allocate a job spare from the unallocated subset based, at least in part, on the dimensions of the HPC job, wherein the software being operable to execute the selected job comprises the software being operable to execute the selected job using the dynamically allocated job spare.

~~dynamically allocate a job spare from the unallocated subset based, at least in part, on the dimensions of the HPC job; and~~

~~wherein the software operable to execute the selected job comprises software operable to execute the selected job using the dynamically allocated job spare.~~

14. (Currently Amended) The software of Claim 9, wherein the plurality of HPC nodes ~~comprising~~ comprise a first plurality ~~and the software, the software being~~ further operable to:

determine that dimensions of the selected job are greater than a topology of the first plurality;

select one or more HPC nodes from a second plurality, each of the second HPC nodes comprising an integrated fabric; and

add the selected second HPC nodes to the unallocated subset to satisfy the dimensions of the selected job.

15. (Currently Amended) The software of Claim 14, further ~~comprising returning~~ operable to return the second HPC nodes to the second plurality.

16. (Original) The software of Claim 9, further operable to:  
determine that a second HPC job that was executing on a second subset in the plurality of HPC nodes has failed;  
add the second subset to the unallocated subset; and  
add the failed job to the job queue.

17. (Currently Amended) A system ~~for job management in an HPC environment~~ comprising:  
a plurality of HPC high performance computing (HPC) nodes, each node ~~including~~ comprising an integrated fabric; and  
a management node operable to:  
determine an unallocated subset from the plurality of HPC nodes;  
select an HPC job from a job queue; and  
execute the selected job using at least a portion of the unallocated subset of nodes.

18. (Currently Amended) The system of Claim 17, wherein the management node being operable to select the HPC job comprises the management node being operable to select the HPC job from the job queue based on priority, the selected job comprising dimensions not greater than a topology of the unallocated subset.

19. (Currently Amended) The system of Claim 18, wherein the management node being operable to select the HPC job from the job queue based on priority comprises the management node being operable to:

sort the job queue based on job priority;

select a first HPC job from the sorted job queue;

determine dimensions of the first HPC job with the topology of the unallocated subset; and

in response to the dimensions of the first HPC job being greater than the topology of the unallocated subset, select a second HPC job from the sorted job queue.

20. (Original) The system of Claim 18, wherein the dimensions of the first HPC job are based, at least in part, on one or more job parameters and an associated policy.

21. (Currently Amended) The system of Claim 18, wherein the management node is further operable to: operable to dynamically allocate a job spare from the unallocated subset based, at least in part, on the dimensions of the HPC job, wherein the management node being operable to execute the selected job comprises the management node being operable to execute the selected job using the dynamically allocated job spare.

~~dynamically allocate a job spare from the unallocated subset based, at least in part, on the dimensions of the HPC job; and~~

~~wherein the management node operable to execute the selected job comprises the management node operable to execute the selected job using the dynamically allocated job spare.~~

22. (Currently Amended) The system of Claim 17, wherein the plurality of HPC nodes ~~comprising~~ comprise a first plurality ~~and the management node~~, the management node being further operable to:

- determine that dimensions of the selected job are greater than a topology of the first plurality;

- select one or more HPC nodes from a second plurality, each of the second HPC nodes comprising an integrated fabric; and

- add the selected second HPC nodes to the unallocated subset to satisfy the dimensions of the selected job.

23. (Currently Amended) The system of Claim 22, wherein the management node is further operable to return the second HPC nodes to the second plurality.

24. (Currently Amended) The system of Claim 17, wherein the management node is further operable to:

- determine that a second HPC job that was executing on a second subset in the plurality of HPC nodes has failed;

- add the second subset to the unallocated subset; and

- add the failed job to the job queue.

25. (New) A method comprising:

- selecting a first job in a job queue based on a priority of the first job, the first job having a higher priority than a second job in the job queue and a third job in the job queue;
- determining a first shape among a plurality of nodes for execution of the first job;
- determining whether a first subset of the plurality nodes collectively capable of accommodating the first shape is unallocated;
- if the first subset is unallocated, allocating the first job to the first subset for execution;
- if one or more of the nodes in the first subset are allocated, leaving the first job in the job queue and selecting the second job, the second job having a lower priority than the first job and a priority higher than the third job;
- determining a second shape among the plurality of nodes for execution of the second job;
- determining whether a second subset of the plurality nodes collectively capable of accommodating the second shape is unallocated;
- if the second subset is unallocated, allocating the second job to the second subset for execution; and
- during execution of the second job, if a third subset of the plurality of nodes becomes unallocated and the third subset together with at least a portion of the second subset are collectively capable of accommodating the first shape:
  - stopping execution of the second job and returning the second job to the job queue ahead of the third job;
  - deallocating the second subset; and
  - allocating the first job to the third subset and the portion of second subset for execution.

26. (New) Software embodied in one or more tangible computer-readable media and when executed operable to:

- select a first job in a job queue based on a priority of the first job, the first job having a higher priority than a second job in the job queue and a third job in the job queue;

- determine a first shape among a plurality of nodes for execution of the first job;

- determine whether a first subset of the plurality nodes collectively capable of accommodating the first shape is unallocated;

- if the first subset is unallocated, allocate the first job to the first subset for execution;

- if one or more of the nodes in the first subset already allocated, leave the first job in the job queue and select the second job, the second job having a lower priority than the first job and a priority higher than the third job;

- determine a second shape among the plurality of nodes for execution of the second job;

- determine whether a second subset of the plurality nodes collectively capable of accommodating the second shape is unallocated;

- if the second subset is unallocated, allocate the second job to the second subset for execution; and

- during execution of the second job, if a third subset of the plurality of nodes becomes unallocated and the third subset together with at least a portion of the second subset are collectively capable of accommodating the first shape:

- stop execution of the second job and returning the second job to the job queue ahead of the third job;

- deallocate the second subset; and

- allocate the first job to the third subset and the portion of second subset for execution.